563 They nomadize near the Garet ed Djenoun, the Aseksem, Amegid, and the Adrar Torha; they own about 300 goats and 30 [233] camels. (1938 census, as opposed to 600 goats and 200 camels in 1905.)

[241 423] They are the owners of a few gardens in the Tafedest.

[795] They are quite religious and members of the Tijaniyyah order.

[65] The Kel Tafedest annually pay the amenokal four loads of dates and a young camel.

The Kel Immidir. -- The Kel Immidir, or Kel Mouydir, are still called Iheiaouen-n-Tin-Emma. They are of the same origin as the Iheiaouen Hada and the Kel Tazoulé.

[162] They are subdivided into Kel Terahart and Kel Raris and include about 50 people. They nomadize in the Immidir massif toward Joraf and Tagmout and have areas for nomadization between Ifetessen and In Eker.

[233 464] They are poor people who own about 20 camels and 250 goats. Very good merchants and excellent caravaneers, they hire themselves out to camel owners to provide for their needs.

[162] /201/ The Isselamaten must be added to the Kel Immidir. They are a small fraction of about 15 tents which lives with them and nomadize near Aneserfa, Arak, Ahohor, Tagemout, and Tiredjert.

The Kel Tazoulet. -- The Kel Tazoulet or Dag el Mesk camp in [162 233] the Tazoulet region and near Tazerouk. They number about 225 people and own 285 camels and more than 2,000 goats. They dryness of the region which they inhabit forces them to take refuge in the [132] Sudan when there are no rains in the Ahaggar.

[241 423] They possess gardens at Bloumet, Iberbern Touakkine, and at Tazerouk.

[669] They were in contact with the Ait Loaien and followed the latter in revolt, participating with them in the battles of Tit and the Ilaman wadi.

[795 798] They are quite religious and members of the Tijaniyyah. Four or five of their number have made the pilgrimage to Mecca.

631 Taken away from the Tăitok and made free, they were put back under their command in 1909.

631 131 They nomadize from Silet to Reggan and Aoulef. The land over which they range includes all of the Ădrar Ăhnet, the Ăseg'rad, and part of the Immĭdir. The boundaries which separate them from the Issekkemăren are as follows: Tin Tir'atimine and Tagemout (belonging to the Kel Immĭdir) on the northeast; Arak wadi as far as Amsir, and Méniet (belonging to the Kel Immidir) on the east, by the In Rabir well; they have at their disposal all the mountainous part on the south, including In Ziza and Nahalet, that is, the whole region bordering on the Tanezrouft and bounded on the east by Ouallen, the last watering place before the Tanezrouft; to the north by the Ăsouf Mellen wadi.

[132] In dry years they descend to the Sudan in the region of In Abangarit-In Gall and Tamaŭa. They camp near the Tăitok in the Ădrar Tazerzaït, where they escape the control of the Algerian and Sudanese authorities.

They formerly exploited a sebkha in the In Méraguen wadi.

631 [162] In 1905 they were a group of 35 to 40 tents. In the 1938 census, they numbered no more than 58 persons, 21 of them men.

[181 721] Rather pugnacious by nature, they always accompany the Tăitok on their expeditions and share the loot with them in equal parts.

[669] During the World War, they stayed in the Ăhnet and /207/ took part in the revolt only individually by supplying the rebels, willingly or by force. Only at the end of 1917, under the influence of Ăjjer elements, did they rise up and pillage in Ădrar and at Ăkabli.

[181 795] They are rather unreligious; they follow the Malekite rite, and some are members of the Tijaniyyah order. They profess great respect for the marabouts and willingly receive them in their camps. At the beginning of the conflict the agitator Abidine of the Timbuktu Kounta, took refuge among them; he had led the [669] struggle against us in Timbuktu for a long time.

361 When a state of war existed, concealment was a capital necessity
609 easy to understand. By atavism, it seems that they have taken the
[721] habit of always placing themselves in spots where they escape the investigation of indiscreet glances.

They set up their tents on valley terraces, and sometimes in a
361 valley itself, if they do not have to fear the rains, which usually fall
[732] at the end of the summer.

Because of the need to seek out pastures, camps are continually
221 being moved. They stay from one to two weeks, depending on
361 whether the grass has been revived by rains or whether it is dry. But these moves are never of any great distance, not exceeding seven or eight kilometers. If we take as an example the Dag Rali tribe which nomadizes in the western part of Koudia, we find the camps set up in the high mountain valleys, as high as 2, 400 meters altitude, in summer. In winter, on the other hand, they settle on the slopes or in the low parts, seeking places sheltered from the wind. This, of course, is in a normal period of average pasture. But during the summer of 1940, following a long dry period, the Upper Koudia saw a great number of its watering places dry up, and vegetation was nonexistent, so to speak. Therefore, all the nomads took refuge in the low parts of the massif, in the Outoul, Eferer, and I-n-Amegel valleys where water was more abundant and where a trace of pasture still remained. At the beginning of September, the whole massif benefited from abundant rains. A week later, all the tents moved into the mountains in order to use the alpine pastures before winter and to save the lower valley grass for winter.

312 /223/ The watering places of Atakor are chiefly natural reservoirs (aguelmam) and springs flowing at ground level in the hollows of the valleys. In the middle part, there are mainly rédir (abankor), or little wells, dug less than one meter down in the soil to reach the water layer, which is often retained by rocky sills. These rédir are exhausted in time if rains do not come to renew the water accumulated in the sandy wadi bed. The lower part of the Ahaggar benefits from all the water trickling down from the high mountains

342 crosspiece forming the central frame; four vertical stakes are placed two by two on each side of the tent.

[171] This model used to be much more widespread in the Ahaggar, and it seems to be an older form, for the model presently used must have been taken from the Ioullimmiden. All the old people recall having seen it used in their youth in all camps on an equal basis with the vertical stake form.

The tent with arches, the upper part of which forms a kind of dome, is better able to withstand the rains than the other. If [182] that was its raison d' [132] être, we may understand why it disappeared with the gradual drying out of the Sahara. This disappearance may also have been caused by the difficulty of procuring large roots to make the arches.

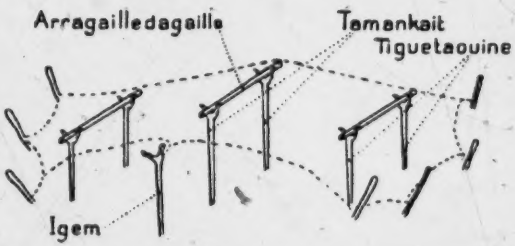

Fig. 25. Tent used by the Kel Rela. During the rainy season, the two central stakes are replaced by a single stake holding up a ridge tile.

[386] The awning is always covered with a coat of red ocher which protects it from the heat of the sun and from the rain.

[285] In both models, the tent always includes a sort of detachable closing made of a long mat (asaber) woven from the stems of graminaceae. It is unrolled inside around the stakes to close the tent completely. High up in the mountains the Tuareg reduce the inside area of the tent in order to keep warmer, and provide the part opposite /225/ the opening with a little stone wall which effectively protects them from the cold. The door is always opened toward the south.

252 They may not heat camel's milk which has just been milked
825 under penalty of causing sickness to the animal which gave it.

264 Insofar as personal interdicts are concerned, there are none to speak of, for although men and women must not eat together, this is a custom rather than an interdict.

[606] A married man must not eat with his parents-in-law, and the oldest son must not eat with his father. These are mainly marks of respect, perhaps traces of ancient practices of a religious nature.

/240/

Chapter 4

Hunting and Fishing

080 We shall now say a few words on the industries allied to the problems of food, that is, on hunting, fishing, animal husbandry, and agriculture.

136 Hunting. -- In a country where fauna was at all dense, hunting
174 would have brought a not inconsiderable dietary supplement to the Ihaggaren. In the past it was very much esteemed in the Sahara. Many rock drawings and paintings prove this, for they depict hunting scenes which interpret the state of civilization of the men, their preoccupation, and at the same time the nature of the fauna, which has changed a great deal since then.

[132] Today, with the very advanced drying out of almost all the
224 Saharian districts, the fauna has come out into the open and the species likely to be usefully hunted are reduced to a few. Only gazelles and wild sheep are still hunted. We cannot mention the addax and oryx antelopes, for the former is in the process of becoming extinct in the Sahara, while the second is confined to the steppe zone. The hare and jackal may be accessorily added.

312 include a first subterranean part made of numerous wells of depths varying from two to four meters, linked together by a small canal serving as a water conductor; then comes a part on top of the ground in the form of a canal, first at the same level as the wadi, then at a slightly higher level. They empty into the distribution reservoirs (majem), which by secondary canals (seguia) carry water to the gardens to be irrigated.

311 361 [342] These agricultural centers therefore extend along the wadi on both sides of its banks. The cultivators settle near their gardens and live in straw or reed huts or little clay houses.

There are five centers in the high mountains between 1, 500 and 1, 800 meters in altitude, but the majority are located between 1, 200 and 1, 500 meters. Some of them can be lower, such as Silet (730 meters) and I-n-Amegel (1, 030 meters).

245 Some are small date groves such as Silet and Tibeghîn, which have 10, 000 palm trees, Ideles, Tâhârt, and Ăbalessa, but because of its altitude, the Ahaggar does not seem to be very suitable for date growing. The instability of the harratin is also an obstacle to the development of arboriculture which demands continual care. Cultivators who can be here today and gone tomorrow would not be capable of interesting themselves in work from which they could not draw immediate profit. The country would lend itself, however, to rather large-scale cultivation of peaches, /246/ apricots, figs, and grapes. The little center of Tăzerouk has many peach trees, and the center at Tit produces a famous raisin.

134 The Ahaggar soil is of a high quality, owing part of its richness to elements of volcanic origin which make up a large proportion of the alluvial deposits. Furthermore, the climate favors 132 241 agriculture so much that the natives obtain two or even three harvests a year.

24 In the medium altitude centers, they sow wheat and barley in December and harvest it in May. Barely finished with this, they sow millet which is harvested at the beginning of October. In between the natives also engage in kitchen gardening: carrots,

turnips, onions, garlic, pimento, beans, pumpkins, native melons, watermelons, various gourds of local origin, and sometimes lentils. These vegetables belong properly to the cultivator and not to the proprietor of the garden. They are consumed by him, for the Tuareg generally disdain them and eat them only when they are staying in the agricultural centers.

But these centers may be handicapped by numerous climatic factors.

Rains are obviously beneficial when they come at the right time; unfortunately, they most often fall in winter or in summer, seasons which do not correspond to the largest growth of vegetation. The plants benefit from them only when the rains are very abundant and the ground can store up water for several months. But still, rainfall must not be too strong, or else it can cause the wadies to overflow and immediately destroy the feggaguir. It then requires several months to reconstruct them and in the meantime the crops which cannot be irrigated dry up on the spot and are completely lost.

Cold can also have a disastrous effect. Winter wheat does not suffer from it but its development is slowed up. It is much worse for arboriculture, for if it is late and comes after the trees have blossomed, which sometimes occurs in January, it is likely to stop pollination completely. Fortunately, trees in arboricultural centers like Tazerouk bloom much later and there are only sudden frosts to fear.

/247/ The wind which blows violently in the spring may also hinder arboriculture by knocking down flowers or young fruits, indeed even fruits which are almost ripe. The great hot summer winds endanger the harvest by the intense drying they cause, unless this difficulty is overcome by abundant watering. Now, it is precisely at this time that the flow of the feggaguir decreases as a result of the heating of the soil and the intense evaporation.

It may thus be seen that agriculture in the Ahaggar is subject to many risks and that the harvests may be very variable. The abundance or scarcity of water causes the seeded areas to vary in

the proportion of one to four. After several dry years some agricultural centers must be completely abandoned. This was the case of Tit, Attoklane, Tâhârt, Dar-Mouli, etc., in the last few years.

In 1940, 555 hectares of land were seeded. This is the figure for a good year, which can occasionally be surpassed but can also be reduced by more than half.

The population of the agricultural centers, which was 1, 310 people in 1916, was 2, 280 in 1938, which denotes a great effort made in favor of agriculture. This could be realized thanks only to the state of peace due to the French occupation.

Here are the figures for each of the principal centers, according to the archives of the Tamanrasset post (1):

1. Florimond report, 1938.

	1911	1938	
Tamanrasset	150	686	
Abalessa	272	250	
I-n-Amgel	180	206	
Iglen		168	
Ideles	70	160	
Tazerouk	150	148	
Tit	75	98	had to leave for other centers after the summer of 1938.
Tarhaouhaout	140	91	
Amsel	90	66	
Tahifet		39	
Tigeneouin	25	23	
Mertoûtek		60	
Hirhafok		80	
Ilâman	10		

174 /250/ introduced before or after the Christian era, it is nonetheless true that the ancestors of the Tuareg must have introduced it.

182 233 At the present time, human life in the Sahara, which is already of little consequence, would be reduced to zero without the camel. This is a fundamental fact which has been amply demonstrated and which it is useless to dwell on. Th. Monod, who dedicated one of his works "To the camel and the goat, the vehicle and the container, the two sole conquerors of the Sahara," (1)

1. Méharées/ Meharis/.

has not only been literary and witty, he has put the truth in a few words. Without the camel, no relation would be possible between the oases, no relation between North Africa and intertropical Africa.

233 One may therefore easily understand that the animal plays a large part in the life of the Saharian Tuareg, and that the latter make a great effort to raise camels. They have always endeavored to own many camels, and at the present time their livestock has increased to more than 10, 000 head.

[132] [492] Although the camel has adapted perfectly to the Saharian pastures and terrain, it is nonetheless true that the aridity is such that he has difficulty keeping in good condition, and that a slightly prolonged march has to be compensated for by a rest period lasting twice as long as the period during which he was tired out. That is [361] why the Ihaggaren nomadize with their camels on the borders of the Sahara in the steppe where there are acacias and graminaceae.

232 Ahaggar breeding is very famous. It furnishes animals which are resistant, very frugal eaters, capable of braving mountain rocks or marching for weeks on end over the granite regoliths of the Tanezrouft, something the Sudanese -bred camels could not do.

The Tuareg select the animals when they are very young, destining them either for saddle camels or for pack camels. The meharis are castrated and undergo special training. In speaking of

several different spots, and it is not impossible that the species bred today in the Ahaggar is of African origin. Bones of the species are found in the Neolithic layers of the Sahara.

At the present time there is a death struggle between the goats and trees in the Ahaggar. The goat itself is capable of browsing the lower branches and destroying them, thanks to its agility. The Tuareg do the rest when pasture is scarce, by felling the main branches to put them within the reach of the animals. And so, in a relatively short time, trees, and the tahla (Acacia sp.) in par-particular, will be only a memory in the Ahaggar. Nothing has

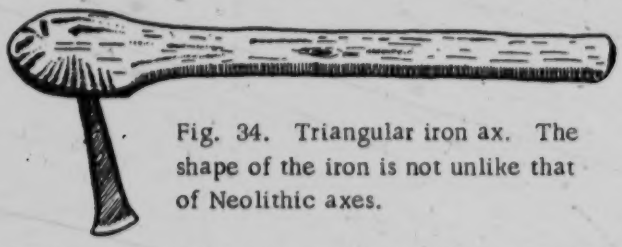

Fig. 34. Triangular iron ax. The shape of the iron is not unlike that of Neolithic axes.

been done by the French administration in the Ahaggar to protect the trees, when it would be sufficient to close some valleys for several years, while taking into account the needs of the shepherds. Measures of this kind have been taken in the environs of Goundam and have given very good results.

Prolonged dryness which causes a lack of pasture often puts goat raising in difficulties. The birth rate is stopped short, and mortality may result to such a great extent that the number of animals sometimes falls to one fifth. Then many years are needed to build up the flocks, granting, of course, the arrival of favorable rains.

The careless and fatalistic Ihaggaren do not even try to step up breeding by buying sires in Adrar or in Aïr. They let their weak flocks reconstitute themselves by their own means, which sometimes requires many years. In case of an overabundance of births, they limit the number of animals, for they are well aware

233 tents, where a few camps live permanently, filling the function of
361 shepherds for the people remaining in the Ahaggar.

At the same time, then, there is nomadism and transhumance.

Definitions of the two kinds of life are as follows: there is nomadism when the tribe accompanies the moving livestock, and transhumance when the flocks are accompanied only by shepherds. And so we see that it is not possible to link the Tuareg to one category or the other, but that they engage in the two kinds of life, even in a mixed system in some instances. Quite often, in fact, the goats are pastured in the Ahaggar with a few shepherds, while the women stay in the mountains, and all the men are in the Sudan with the camels.

/255/ The migrations of these little herds of goats recall the moving of flocks which Vidal de la Blache has described as "mountain transhumance," that is, the camps move regularly from the summer pastures located on the peaks to the winter pastures in the
● [132] plain. These moves cannot be as regular as they are in our country, in view of the irregularity of the rains.

It may thus be said that the Ahaggar Tuareg are small nomads by the short range of the moves of their camps, but that they are, on the other hand, great transhumants.

Rules Concerning Passage and Nomadization With Flocks

423 The lands over which the tribes range are fixed by the amenokal
643 to whom the land appertains. The origin of the tioussé comes
651 partly from the pasture rights which he grants.

Each tribe is proprietor of its land, with full and exclusive
423 enjoyment of it. Others can come settle among the tribe only with
621 the authorization of the tribe's amrar, but the right of way, including the right to water flocks, is secured for everyone.

These rules may be modified in periods of great dryness or in periods following plentiful rains.

5: Nicolaisen E-4, 5 (1951-1955) 1959
MS25 Tuareg MS25

Tuareg Letters (*Tifinagh*)	Transcription And Value In Arabic Letters		Notes
ⵖ	ɣ	غ	Prononcunced gutturally. Frequently transcribed as gh in literature.
ⵙ	s	س	
ⵜ	t	ت	
ⵟ	ṭ	ط	Emphatic
ⵣ	z	ز	
ⵥ	ẓ		Emphatic

For certain geographical names the mode of spelling is in accordance with that of the maps edited by Institut Géographique National. The pronunciation of vowels is not indicated. At the end of words the Tuareg sometimes indicate vowels with a dot, which may stand for any vowel.

Pastoral Ecology in Ahaggar and Air.

The Tuareg of the true desert country have their camps in or close to mountain massifs of which the more important are Ahaggar and Tassili-n-Ajjer. Geographically these two regions have many traits in common. In Ahaggar, which rises to 3000 metres above sea level, the annual precipitation according to official statistics is between 20 mm and 40 mm. These figures are extremely low, but more characteristic of the desert country is the irregularity of the rainfalls. In some years there may fall no rain at all, while in others precipitation is much bigger than appears from the figures above. Several dry years may follow each other alternating with periods of abundant rainfall. According to investigations by Dubiéf four years out of ten are so dry that rainfall is of no importance for the regeneration of pastures (Dubiéf 1947, p. 7–23). Owing to the scarcity and the fluctuations of precipitation in Ahaggar a persistent vegetation cannot generally exist outside river valleys and depressions which are flooded during heavy rain. In the valleys perennial plants comprise not only grasses and herbs but also tall trees among which tamarisk and acacia are prominent. In dry years the perennial plants have little value as fodder for the domestic animals of the Tuareg. A great many goats may then die from hunger, and to avoid such a disaster some Tuareg take their flocks to the plains of Tamesna or to the Adrar-n-Iforas Mountains where rain is normally more plentiful and grazing better than in Ahaggar. However, even in dry years the majority of Ahaggar Tuareg will remain in their native country with their goat-flocks. For although they run the risk of losing a great many goats during a drought in Ahaggar

5: Nicolaisen E-4, 5 (1951-1955) 1959
MS25 Tuareg MS25
Ahaggar
Air

132 262 [234] During drought periods the uttermost poverty is the lot of the Ahaggar Tuareg, who must then rely almost exclusively on agricultural products for their nourishment. But in years of abundant rainfall they have much milk during the winter, and they make butter and cheese to be used during the hot season when milk even in good years is scarce. They then also have meat for their sustenance but this is less important than milk-food.

137 233 In good years the perennial plants do not form the most important fodder of the domestic animals. For heavy rainfall will as if by magic change the barren country outside the valleys. An extremely rich vegetation of annual grasses and herbs springs up, and these tender plants constitute the very best fodder. But as, owing to the irregularity of the rainfall, annual pastures will not appear every year, it is difficult to breed other animals than goats and camels to which can be added donkeys used exclusively as beasts of burden and for riding. It is true that most Ahaggar Tuareg have a few sheep but none of them have cows (zebus). Cow-breeding and also effective sheep-breeding cannot be practised in a country like Ahaggar where for a period of years there may be no pastures of annual plants. In dry years the thorny acacias form the most important fodder of camels and goats, but the leaves of these trees cannot be eaten by cows and only with great difficulty by sheep.

132 In Ahaggar rain may fall at most seasons as the country is situated on the frontier of two different rainfall belts, namely that of the Mediterranean where rain occurs mainly in winter, and that of the Sudan where rain will fall late in summer. For a long period of years rain has fallen most abundantly late in summer, but according to Dubiéf this has not always been so. Not many years ago rainfall was almost equally common at all seasons (Dubiéf 1947, p. 7–23), and Ahaggar 137 still has the characteristics of two distinct climatic zones, likewise as botanically it belongs both to the Mediterranean and to the Sudan.

[132] On my camel journey from Ahaggar to Air via the wells of In Ebeggi and In Azaoua in April 1955 I experienced a rapid change of climatical and botanical conditions. At the outskirts of the southern slopes of the Ahaggar Mountains a persistent vegetation is very scarce in the valleys, and between the two above-mentioned wells there are practically no permanent plants. Broadly speaking the [133] desert region between Ahaggar and Air is nothing but plains of gravel and stone interspersed with rocks and hills. But a little scattered rain will occur even in these [132] regions and gives rise to annual pastures which are utilized by passing caravans. Otherwise the country is uninhabitable.

In the northernmost part of the Air massif acacias and tufts of perennial grasses grow in most valleys as in the lower parts of the Ahaggar Mountains. But compared with Ahaggar permanent vegetation is very rich and in places forms almost impenetrable jungles of trees and brushwood. Further south in Air perenniel plants including trees are very common also outside the valleys, and the country south of the massif very rapidly changes into a kind of steppe or open savannah. The com-

5; Nicolaisen E-4, 5 (1951-1955) 1959
MS25 Tuareg MS25
Ahaggar
Air

paratively rich vegetation of Air contains species found also in Ahaggar, but Ahaggar has Mediterranean plants including several saline species which do not thrive in Air, where there are tropical or Sudanese species unknown to Ahaggar. 137

Botanically Air is very closely connected with the Sudan, and the mountain massif is within the Sudanese zone of summer rain. It is true that rain at the northern outskirts of Air occasionally falls in winter and may then give rise to scattered pasture of annual plants, but these rains are of no real importance. The important rainfalls of Air occur in the period June-September, and particularly in July and August. As may be gathered from the description of botanical conditions, Air has a much bigger annual precipitation than has Ahaggar. Thus the village of Iferouan in Northern Air has 74 mm, while Agadez at the southern slopes of the massif has 179 mm. Precipitation will of course vary from one year to the other, but rain will always fall sufficiently for the spring of annual plants. This is the reason for a type of stock-breeding different from that of Ahaggar. In Air the Tuareg are richer in camels, they do not possess so many goats but are very rich in sheep, and most of them have zebus. 132 137 [233]

The climatic and botanical differences of Air and Ahaggar can be seen more directly from the division of the year into seasons (fig. 2). Air has a summer and a winter season between which there are two seasons termed *akasa* and *ţarat*. These two words as seasonal terms express the fact that rain and annual pastures in Air are recurrent events, as the word *akasa* literally means "green annual plants", and the word *ţarat* refers to "dry annual plants". Both words are known also to the Ahaggar Tuareg but are by them not applied as seasonal terms, for in their country rain will not occur every year and may fall at most seasons. 132 805

Conditions for stock-breeding are very much better in Air than in Ahaggar, but the latter country has a few superior qualities:– 1) Part of the year Ahaggar has a comparatively cool climate which is said to have a positive influence on the lactation of domestic animals. 2) In Ahaggar all over the country there are saline pastures which play an important part in stock-breeding – not because these plants are very nourishing but the animals do not thrive without salt. In Air saline plants are very rare and found mainly to the south and south-west of the massif where water and soil also contain salt. Many pastoralists will migrate to these regions shortly after the rains, while people who do not undertake such migrations feed their domestic animals with salt. Camels and cows have a particular need for fodder with a salt content. 3) Ahaggar has richer wells and a greater number of permanent ponds than Air. This may seem rather peculiar as precipitation is much bigger in the south than in the north. In Ahaggar and Tassili-n-Ajjer some ponds may contain fish apparently unknown in Air. In the latter country there are a great many ponds or even small lakes during the rains but they dry out very quickly when rainfall ceases. Water in Air most of the year is drawn from wells many of which go dry during the hot season; this will frequently lead to quarrels between nomads. 233 [132] [135] [137] [221] 312 [136] [578]

5: Nicolaisen E-4, 5 (1951-1955) 1959
MS25 Tuareg MS25
Ahaggar
Air

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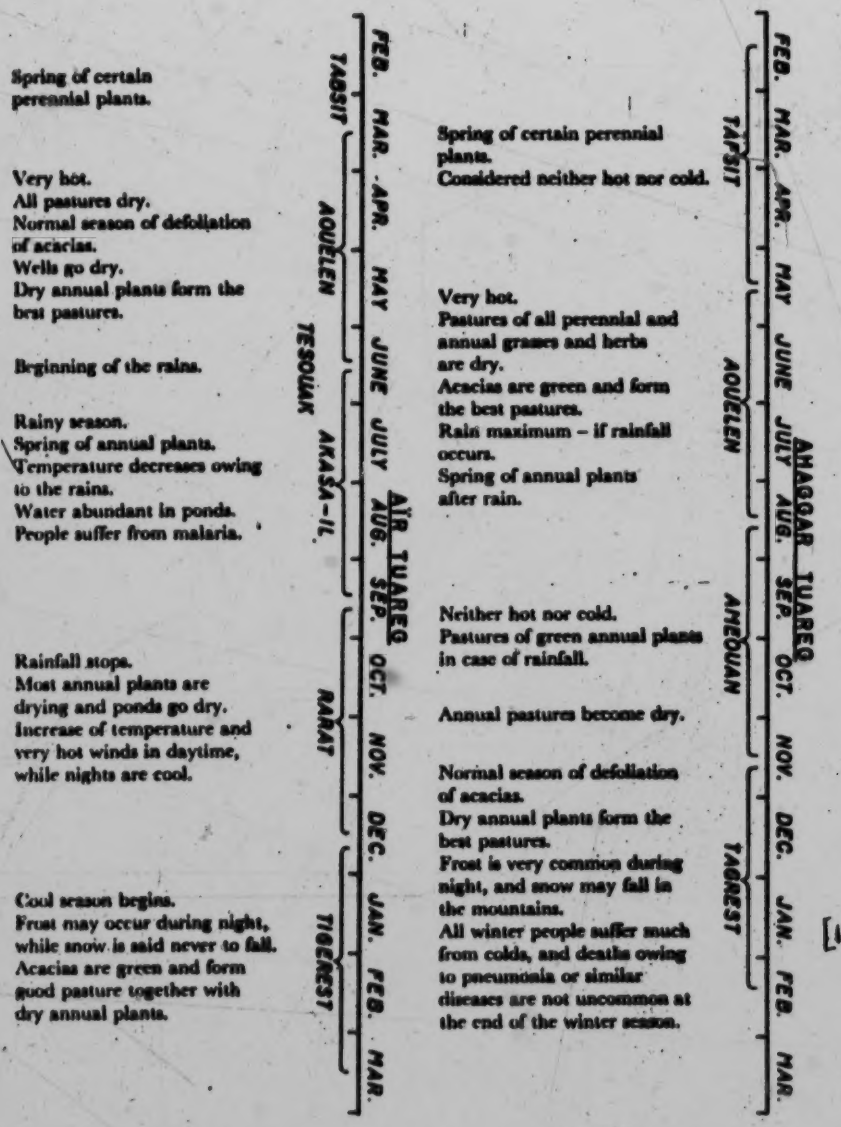

AÏR TUAREG
FEB. MAR. APR. MAY JUNE JULY AUG. SEP. OCT. NOV. DEC. JAN. FEB. MAR.
TAGSIT
AOUÉLEN
TESOUAK
AKAŠA-IL
RARAT
TIGEREST
Spring of certain perennial plants.
Very hot.
All pastures dry.
Normal season of defoliation of acacias.
Wells go dry.
Dry annual plants form the best pastures.
Beginning of the rains.
Rainy season.
Spring of annual plants.
Temperature decreases owing to the rains.
Water abundant in ponds.
People suffer from malaria.
Rainfall stops.
Most annual plants are drying and ponds go dry.
Increase of temperature and very hot winds in daytime, while nights are cool.
Cool season begins.
Frost may occur during night, while snow is said never to fall.
Acacias are green and form good pasture together with dry annual plants.
AHAGGAR TUAREG
FEB. MAR. APR. MAY JUNE JULY AUG. SEP. OCT. NOV. DEC. JAN. FEB. MAR.
TAFSIT
AOUÉLEN
AMEDUAN
TAGREST
Spring of certain perennial plants.
Considered neither hot nor cold.
Very hot.
Pastures of all perennial and annual grasses and herbs are dry.
Acacias are green and form the best pastures.
Rain maximum – if rainfall occurs.
Spring of annual plants after rain.
Neither hot nor cold.
Pastures of green annual plants in case of rainfall.
Annual pastures become dry.
Normal season of defoliation of acacias.
Dry annual plants form the best pastures.
Frost is very common during night, and snow may fall in the mountains.
All winter people suffer much from colds, and deaths owing to pneumonia or similar diseases are not uncommon at the end of the winter season.

[161]

[164]

Fig. 2.–Division of the year into seasons among the Tuareg of Air and Ahaggar. Climatic and botanical characteristics are indicated. (The proper spelling of *tagerest* (tigerest) is *tagrest*, (tigrest) while *rarat* should be written *ŕarat*).

5: Nicolaisen E-4, 5 (1951-1955) 1959
MS25 Tuareg MS25
Ahaggar
Air

and giraffes are found in the plains immediately south and west of the massif. I do not wish here to compare in detail the natural history of Air and Ahaggar. But I wish to emphasize the fact that climatically, botanically, and zoologically an important dividing line runs between these two Tuareg countries. This should not be overlooked in an anthropological description of these parts of Northern Africa.

At present both fair-skinned Europids and black-skinned negroid people live all over the Sahara, and are frequently mixed. There seems to be little doubt that in the north most negroes have come in with the slave trade. We cannot entirely exclude the possibility that part of the northern negroes constitutes an ancient population of the Sahara (cf. Capot-Rey 1953, p. 167ff.), but in Ahaggar the negroes seem to have arrived later than the fair-skinned Berbers. Until a hundred years ago all negroes of Ahaggar where apparently Tuareg slaves bought or captured in the Sudan, but the negroid Haratin then immigrated from Tidikelt to make gardens for the Tuareg. They introduced the irrigation systems known to the Tuareg as *efeli*, to the Arabs as *foggara* (i.e. irrigation by means of subterranean aqueducts), but the solid houses built of mud *(tafahamt)* so characteristic of the northern oases were apparently not introduced by the first immigrants of Haratin, but later. Another immigration of negroid agriculturists came from Tassili-n-Ajjer and in particular from the oasis of Djanet. It is not quite certain whether they came before or after the Haratin. They are said to have introduced irrigation by means of wells *(tanout)* from which water is drawn by zebus (or donkeys), and two particular types of dwellings are also ascribed to them, namely a subterranean or semi-subterranean dwelling *(edamous)* and a square hut *(ekebor)* covered with straw or rushes. Immigrations of predominantly negroid agriculturists from Tidikelt and Djanet take place also in modern times, but all the present agriculturists do not descend from immigrants of these regions. A large part of them are descendants of Tuareg slaves manumitted by their masters.

Negro slaves have also been introduced from the Sudan to Air by pastoral Tuareg, but there is no doubt that Air originally was a pure Sudanese country anthropologically, as it is Sudanese with regard to climate, botany, and zoology. In other words, the oldest known inhabitants of Air were negroes while the fair-skinned Berbers have arrived at a later date. It is stated both by Nicolas and Urvoy that Air before the Tuareg was inhabited by negroid Hausa or Proto-Hausa (Nicolas 1950a, p. 45. – Urvoy 1936, p. 138ff.), and Barth claims the word *Air* to be relatively late and of Tuareg origin, the word *Azben* also used as a name of the massif to be of Hausa origin and older (Barth 1857, I, p. 369). My investigations fully confirm these statements. All Tuareg questioned about the history of Air seem to admit that the negroid agriculturists have lived in the country before the Tuareg, and there are in the Berber dialect spoken by these people a great many Hausa words. It is, I think, of particular interest that the negroid village population of Air is said to have a kinship system quite distinct from that of all true Tuareg while

133/18 cont./ increases, for /19/ the tributary basins converge and form an immense flat plain called aciaf by the Tuareg.

Seen from afar the tassilis appear to be impassable barriers whose tops, eaten by water erosion and battered by wind, give the illusion of a fortified city. Eroding wadis have cut through these sandstone plateaus, and their deep valleys with vertical sides constitute savage gorges at the bottom of which a relatively dense vegetation contrasts with the aridity of the plateau, which is wholly bare and raked by the winds. Numerous gueltas, often fringed with tahlis (a kind of reed), are found in these tassilis.

[103] Note. -- A few altitudes:

Tahat	3, 003 meters	In the Atakor
Ilaman	2, 823 "	" " "
In-Tarafn	2, 762 "	" " "
Asekrem	2, 804 "	" " "
Tozat	2, 400 "	" " "
Akarakar	2, 216 "	" " "
In-Afilal	2, 157 "	" " "
Garet el Djenoun	2, 327 "	In the Tefedest
Ifetessen	1, 680 "	In the Mouydir

The Climate

●132 Meteorological observations are regularly made only at Tamanrasset and only since 1929. There is a lack, therefore, of exact data for the whole territory. If it is known from Tuareg reports that it has rained in a certain place, the intensity of the precipitation is not known. The information concerning the winds and temperatures is still more vague. However, by taking into account the observations made at Tamanrasset and by examining the vegetation at different places in the Ahaggar, annex, as well as the distribution of the fauna, one can distinguish three climatic zones, which correspond almost exactly

●132 /19 cont./ to the zones of the relief. Let us note, however, that /20/ the tassilis of the south are subject to conditions of wind and rain different from those of the tassilis of the north. Before studying the climatic zones, it is well to sketch in the general characteristics common to all the zones.

The climate is generally of the continental desert type, due to the location of the country.

The Tropic of Cancer divides the territory of the Ahaggar in two; the sun mounts to its zenith, giving the country a Sudanese influence in the form of summer clouds which sometimes condense into stormy rains: "tornado tails." This Sudanese monsoon rarely manifests itself north of the Tropic.

In winter a fairly regular predominance of northwest winds makes possible the transport of Atlantic or Mediterranean rains, which rarely affect the south.

If we turn to consider the different climatic zones, we see that the Atakor is, because of its high peaks, the center of distribution for the waters which condense in the mountains when, by chance, the clouds are low enough. Cloud systems are relatively frequent and often large, but they seem to climb when they reach the mountainous region. The altitude moderates the summer heat, and winter brings light snowfalls on the summits nearly every year. One sees only in the Atakor an [137] outlying sample of Mediterranean flora, a wild olive tree: Olea laperrini. In descending toward the peripheral trench, one encounters the kranka (Callotropis proscera), an essentially tropical shrub. Then, at the border of the central mountains, one finds the fruit-bearing palm at Silet, Abalessa, In-Amguel.

Observations of the meteorological station at Tamanrasset have been used to make rain and temperature graphs, which may be found in the appendix. Information is lacking for the war period. The climate is characterized by the regularity of the temperature and the extreme irregularity of the rains. The heavy rains, however, nearly always fall in summer or winter; when there are rains in both of these seasons, there is a rainy

132 /20 cont./ year as in /21/ 1943: 108.5 millimeters of rainfall; when, on the contrary, atmospheric conditions prevent the Sudanese tornadoes and the Atlantic winds from approaching the Ahaggar, there is a dry year as in 1945: 28 millimeters of rainfall, or as in 1949: 9 millimeters.

In view of the insufficient number of meteorological stations and of the enormous distances which separate them, it is impossible to follow the evolution of the cloud systems or to predict periodic rains.

At Tamanrasset the winds are fairly regular; in the morning the prevailing winds range from east to northeast, and in the evening from west-southwest to west-northwest.

In winter the prevailing winds bringing rain are mostly from the northwest, coming from Moroccan depressions.

In summer the rains come with southwest winds, probably originating in Sudanese cyclones.

Sandstorms are not seen, but there are rare dust storms, particularly in March.

132 821 In calm weather, or even during violent winds, whirlwinds occur. There have been different theories advanced to account for them, but for the time being the question is still open. The Tuareg have their opinion as to the cause of the whirlwinds; they are manifestations of genii, the Tuareg say. Here, moreover, is a story proving them right:

One sunny afternoon a Tuareg woman (others have told me that it was a Negress) was gathering wood in the ravine of Itharentidjarnin when a violent whirlwind materialized about 100 meters away. The dust began to revolve, describing an almost perfect circle, then mounted vertically, turning faster and faster. When the dust column had reached a great height, the whirlwind began to move. It started slowly, hesitating about which direction to take. Finally, it moved southward, spinning, rolling from side to side, and whistling cheerfully. The woman, entranced by this spectacle, showed her delight by loudly crying, "You-you." The whirlwind approached her, tossed her some gold, and thanked her for being merry, for, the whirlwind said, "One of us is being married."

132 /22/ The elders of the camp, to whom the woman related
821 this adventure, said it was really the first time that the Kel es Souf had ever been agreeable.

Some time later the same woman, at the same place, saw a similar whirlwind. Hoping to be rewarded again by the genii, she saluted the whirlwind with gay "you-you" cries as it passed. She had cause to rue this; she was seized, swept from the ground, whirled to an unbelievable height, then abruptly let go to crash on the ground. As she fell, the Kel es Souf told her: "We are in the funeral procession of one of our kind; this is your punishment for mocking us." The woman was found with all her limbs broken. She told her story and died.

132 The climate of Tamanrasset, which at first seems agreeable because of the mild temperature, is enervating in the long run; this is agreed to by everyone who has lived there a certain length of time. Intellectual work is very tiring. Father de Foucauld tried to settle down at the top of the Asekrem, but found he couldn't work there as hard as he could elsewhere. The extreme nervousness that seizes men, and particularly women, after a long stay is also noticeable. What causes these troubles? Doubtless they are due to the combined effects of the altitude and the extreme dryness of the air. Some ascribe them to magnetic effects, and others blame radiations. (1) In point

132
133

1. I once made a curious observation: two years ago I was collecting different rocks, which I tested with a Geiger counter. I marked on each rock the number of "clicks" per minute. One morning I wanted to test my samples. All my rocks were more radioactive by 25 "clicks." By chance, I was

132 /22 cont./ able to report this anomaly
133 to Father Bordet, a geologist come to study volcanism in the Ahaggar. He suggested cosmic radiations, but, not being a specialist in this field, he affirmed nothing, merely noting the information in order to pass it on to a qualified person.

132 of fact, no satisfactory answer has been found.

A second climatic zone is found in the peripheral trench. This region, situated at a lower altitude, has higher temperatures and much less rain. Vegetation is nearly nonexistent there; even in the wadis, the tahlas /see Appendix, Flora/ are not numerous and the morakba /Panicum turgidum/ is /23/ nearly always dry. The kranka no longer is found, nor is the éthel, /see appendix/, and the true Saharan climate reasserts itself, leading to the complete desert of the Tanezrouft and the Ténéré. The gazelles avoid the center of this region; they approach the more humid mountainous country according to the frequency of the rains which nourish acheb (pasturage).

Lastly, in the tassilis a distinction must be made between those in the north and those in the south.

The tassilis of the north receive winter rains nearly every year, and, more rarely, get precipitation coming from the Sudanese monsoon. Information on these regions is not plentiful and is inexact, except concerning the Mouydir, which is crossed by the route from In-Salah and flown over by airplanes from Algiers. It appears from reports of the Tuareg that the Mouydir receives more rain than the Ahnet and the Acedjerad, which seems reasonable because of its greater altitude, and perhaps also because of a system of atmospheric depressions which are suspected but which have not yet been studied.

•132 /23 cont./ The kranka reappears, a sign of less aridity; the tahlas are fairly dense in the wadis; the gueltas /pools/ rarely dry up and are bordered with berdis /Formium tenax/. The wild sheep is a permanent resident of the summits.

There is still less information about the tassilis of the south. Facts are almost nonexistent for the Tassili n'Ahaggar. There is information given by the Tuareg about the Tassili de Tin-Reroh and the Tassili de Timissao, which are situated on caravan routes coming from the Adrar des Iforas toward the Tidikelt or the Ahaggar. They chiefly report summer rains, and rains abundant enough to engender acheb /pasturage/.

These tassilis receive little water from the "tornado tails" because of their medium altitude. However, it rains in the summer nearly every year. The wells of Tin-Reroh and Timissao are never dry. The Tin-Reroh guelts /pool/ sometimes is.

Although not a tassili, the northern border of the Adrar des Iforas has the same sort of climate. This section is of vital importance to the Tuareg of the Ahaggar, who /24/ graze their she-camels there. Summer rains occur regularly; the Sudanese monsoon causes periodic floods. The gueltas in the wadis fill up in the summer and may still have water when the next floods come. Gergir provides abundant pasturage; it lasts nearly all year. Ethel and tamarisk are dense in the wadis, and tahlas begin to grow on the hillsides. The flora of the wadis is more varied. Gazelles are plentiful; one sees Robert's does, oryx and addax antelopes. This is certainly the most favored region in the territory of the Ahaggar annex, but geographically it is already the Sudan.

Water in the Ahaggar

133 312 [132] As in every desert region, the question of water is of primary importance. The Ahaggar is relatively favored by rains. Water points are numerous in the mountainous regions of the

565 /50 cont./ Atakor and the Arechchoum are their pasture regions. It is a tribe of rich camel and goat raisers.

[162 563] It is the most important imrad tribe under the Kel Rela; there are about 390, served by nearly 400 Negroes. The Dag Rali are stubborn mountaineers, a little narrow minded. They [147] are remarkably resistant to fatigue when they walk in their rough country. Let us also note their adaptation to the cold of December, January, and February; the camps are generally situated at an average altitude of 2, 000 meters. The Tuareg [29 132] are clothed in two cotton gandurahs and are quite often wrapped in a "dokali"; they bear cold which drops as low as -12° in the tent toward five in the morning.

The tribe's amrar is Akroud ag Ama (1). The handsomest

1. Died in 1952.

tents belong to the Dag Rali, and the men are renowned as hunters of wild sheep.

[651] The tioussé paid to the amenokal is about 12 mezoued /leather grain sacks/ of dates, eight bottas /bottles/ of butter, the loan of 12 ewes for milk, and ten goats for slaughtering.

Several subgroups may be seen within the Dag Rali, named mainly according to the regions they inhabit: Kel Arechchoumi, /sic/ and the Ikhechemaden, who formerly were imrads of the Ta'ltoks.

[162 563] The most numerous imrad tribe is the Adjouh n'Téhélé. It includes approximately 590 individuals and more than 750 Negro domestics. Although imrads, the Adjouh n'Téhélé are regarded as different by the nobles. Toward the eighteenth century, this tribe, which was living in the A'lr at the time, came of its own accord to incorporate itself into the Kel Ahaggar. This was done to escape the exactions /51/ of the sultan of Agadez, who each year demanded a virgin as a sign of vassalage. This tribe's territory of nomadization extends to the east and south of those of the Dag Rali.

133 /160 cont./ the Ahaggar and which must have lifted the central core. A thorough study of this volcanism has not yet been made by specialized geologists (1). Perhaps it will be

1. Since 1950, P. Bordet has been studying volcanism in the Ahaggar. M. Lelubre's thesis on the pre-Cambrian in the Ahaggar was published during the Geological Congress of Algiers in October, 1952. On this occasion several regional monographs concerning the Ahaggar were published: L'antécambrien de l'Ahaggar /The Pre-Cambrian in the Ahaggar/ by M. Lelubre; Les appareils volcaniques de l'Ahaggar /Volcanic Mechanisms of the Ahaggar/ by Bordet; Ahnet et Mouydir /Ahnet and Mouydir/ by J. Follot.

possible to /161/ separate the essential phases of this eruptive whole.

Study of the Quaternary has not been undertaken. Such a study would perhaps enable us to establish some points very interesting for archeology, notably the advances and retreats of the desert climate.

/163/

III

Meteorology

132 Following are some figures concerning meteorology, furnished by the Tamanrasset observatory and the O. N. M. station.

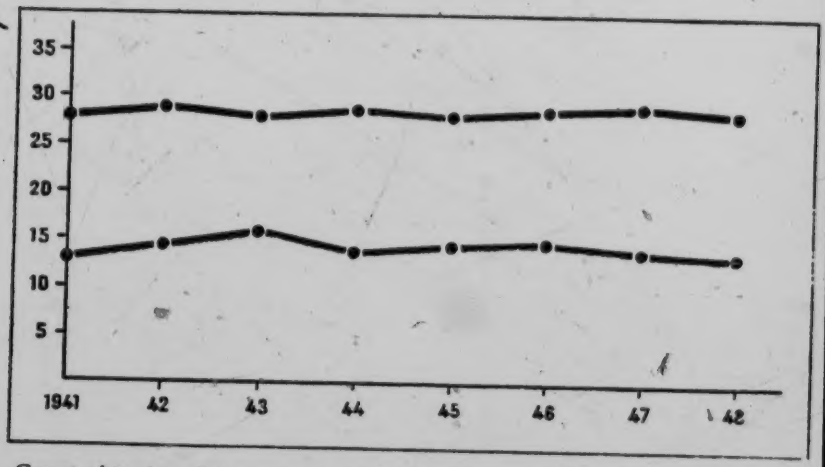
132 /163 cont./

For a period covering 1925 to 1939:

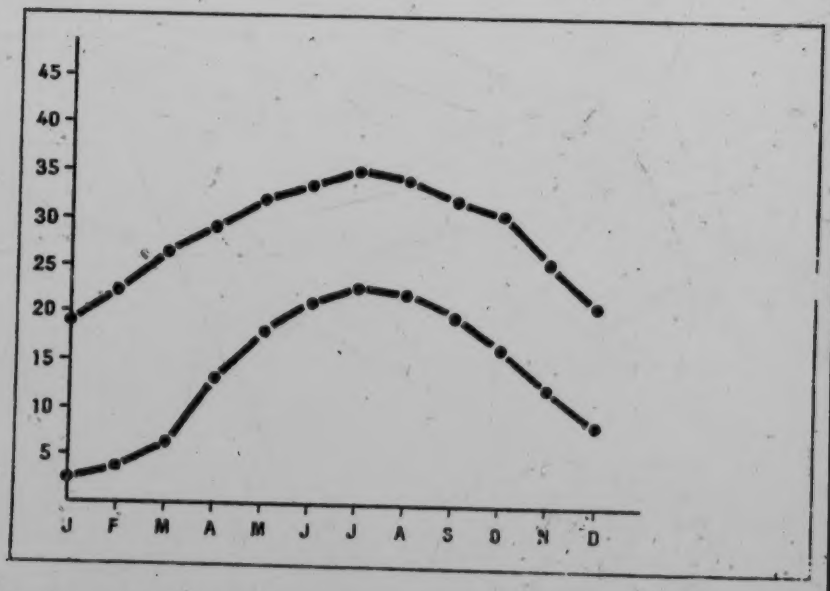
1. Temperature
   - Average of the maxima . . . . . 28.6°
   - Average of the minima . . . . . 13.6°
   - M + m/2 . . . . . 21.1°
   - Amplitude M - m . . . . . 15°
   - Extreme maximum . . . . . 39°
   - Extreme minimum . . . . . -6.6°
2. Relative humidity
   - Annual average . . . . . 33% at 7 a.m.
     21% at 1 p.m.
     23% at 6 p.m.
3. Cloudiness
   - Annual average . . . . . 2% at 7 a.m.
     2.8% at 1 p.m.
     3.3% at 6 p.m.
4. Rain
   - Annual average . . . . . 43.8 millimeters

/164/

● 132



Curve showing the average of maxima and minima from 1941 to 1948



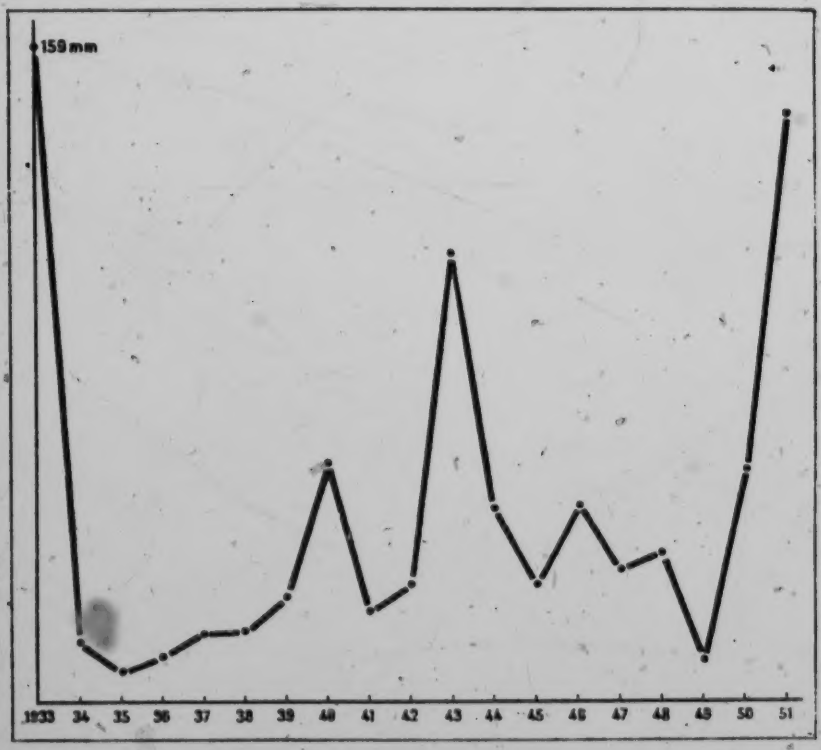
Curve indicating the monthly average of maxima and minima for 1943

6:Blanguernon--153 Y-5 (1937-1954) 1955 MS25 Tuareg MS25
Hoggar

/165/

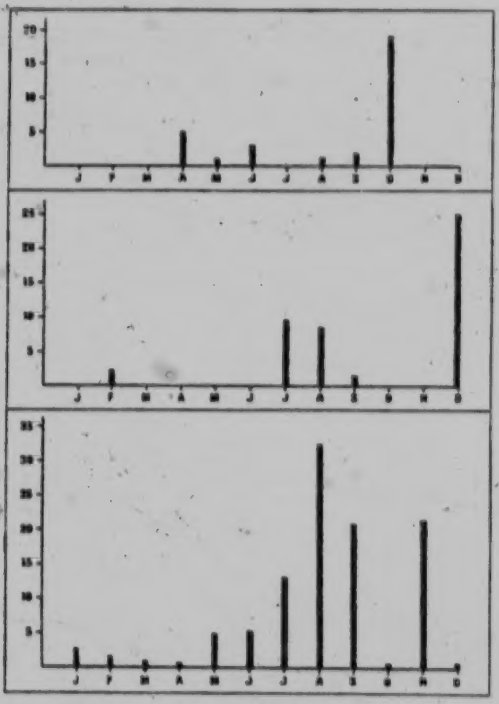
5. Annual precipitation from 1933 to 1951 (in millimeters) 132

1933 :	159	1943 :	108.5
1934 :	14.1	1944 :	45.9
1935 :	6.4	1945 :	28
1936 :	10.3	1946 :	47.5
1937 :	15.9	1947 :	31.3
1938 :	16.6	1948 :	35.5
1939 :	26	1949 :	9.4
1940 :	58	1950 :	56.2
1941 :	22	1951 :	141.4
1942 :	28.8		



Annual Rainfall from 1933 to 1951

●132



1945: Year of light rainfall.

1944: Year of average rainfall.

1943: Year of heavy rainfall.

Distribution of rain during the course of the year.

6. Monthly precipitation during a rainy year

1951:	January	0.8	July	1.4
	February	1.6	August	18.8
	March	0	September	96.4
	April	0	October	0
	May	0	November	0.2
	June	14.9	December	0

7. Monthly precipitation during a dry year

1949:	March	5.3	July	1.2
	April	2.1	August	0.8
	The other months	0		

6:Blanguernon--155 Y-5 (1937-1954) 1955 MS25 Tuareg MS25
Hoggar

/167/ Remarks on the Rainfall

132 M. Dubief of the Algiers Institut de physique du globe has made a very interesting study of the rainfall in the Ahaggar territory, using information furnished by the Tuareg and covering 80 years for the central Ahaggar and 60 years for the Ahnet and the Mouydir.

This research shows that the system of rains in the central Ahaggar is unrelated to that of the northern Sahara.

Moreover, the distribution of the rains in the central Ahaggar has some relation to the distribution in the Tefedest, little to that of the Mouydir, and none to that of the Ahnet; it is completely independent of the Tamesna.

Finally, the dry periods do not seem to exceed seven years (the term "dry" is not used here in its meteorological sense, but relatively speaking, indicating for the nomads a lack of pastures).

Some Tuareg claim to have observed a cycle of seven years in the duration of the ground-water level.

The observations made at Tamanrasset record as years of heavy precipitation: 1924, 1933, 1943, and 1951, which would give a cycle of about nine years.

/169/ IV

Wells or Water Points on the Caravan Trails

From Tamanrasset to Tin-Zaouaten

103 Amsel: Tiggert /natural outflow of water/ and tanout
312/well for irrigating gardens/. Permanent agricultural center.

Tin-Tounatine: Tigget /sic/ and abankor /water hole/ in the Tamanrasset wadi.

7:Nicolaisen E-5 (1951-1962) 1963 MS25 Tuareg MS25

133 Massif resembles Ahaggar, but it is on the whole much more level with broader valleys and in between
131 the lower mountains there are clayey plains. Immediately east of the Massif is the very extended sandy desert which is uninhabited. Further south than Aḍraṛ-n-Foṛas and Ayr there are no considerable mountains. Between the two massifs are the plains of Tamesna and Talak which continue into the plains of the Sudanese savannah.

Tuareg country consists predominantly of rocky mountains and flat, extensive plains of gravel and stone. This configuration is basic to our understanding of Tuareg economy as will become clear when we have outlined the characteristic features of climate.

● 132 Tuareg country is very hot in summer – so hot that even the nomads born and bred in the country suffer much from the heat at that season. The hottest months are May, June (farthest south) and July (farthest north). During these months temperature may exceed 50° centigrade, and is on average 30°–35°, or higher. In the uppermost mountain zone of Ahaggar nights are comparatively cool even in summer, while in the lower country there is often little difference between day and night temperatures. This is true in particular when, as often happens in summer, the sky is overcast during the night and consequently there is little radiation of the heat absorbed by rocks and sand in daytime. The day temperature in summer is normally higher than the temperature of the human body, and the temperature of sand and rocks will rise to 60°–70°. Travelling is extremely hard under such conditions,
[408] and most people spend the day in the shade of rocks and trees, sleeping and drinking water of which
[271] an adult person consumes 8–10 litres a day. Violent winds are common in the Sahara most of the year and in particular in the daytime; in summer these winds are usually very hot and add considerably to the discomfort of the climate, as do the numerous flies.

The country of the Northern Tuareg has a rather continental climate characterized by great fluctuations of temperature during the year. Although Tuareg suffer from heat in summer, they do not generally complain much about it, and they consider the comparatively cold winter much worse than the hot summer. In winter, temperature in the country of the Northern Tuareg averages about 10°. The absolute minimum temperature however is very much below this. Thus in Ahaggar the village of Tamanṛaset (1400 m) has in January an average temperature of 11,7 , but an absolute minimum of –6,6'. Frost is very common during winter nights, and even snow may fall in the higher parts of Ahaggar at that time of the year. In the country of the Southern Tuareg frost may also occur, but in Southern Ayr around Agadez frost is said to be very rare and snow is unknown; the winter period
[510] in the south is on the whole milder than in the north, where the changes between relatively cold and
[164] very hot temperatures, allied with inadequate dwellings and clothes, are responsible for pneumonia and similar diseases, which give rise to frequent deaths – especially among children.

The most important climatic distinction between the countries of Northern and Southern Tuareg is due to differences in the annual precipitation as will be seen from the following figures (in m/m) for the annual rainfall 1931–1945 in the territories of seven Tuareg groups:—

7:Nicolaisen E-5 (1951-1962) 1963 MS25 Tuareg MS25

132

Kel Ahaggar		*Kel Ajjer*	
Iwallen	18.6	Bat	11.4
Édeles	18.9	Ft. Flatters	13.7
Tamanrasset	40.7	Ft. Polignac	17.6
		Ganet	17.8
		Radames	37.8
Kel Adrar		*Kel Ayr*	
Agelhok	75.0	Iferwan	74.1
Kidal	123.2	Agadez	179.3
Iwllemmeden Kel Ataram		*Iwllemmeden Kel Dennek*	
Burem	172.0	Tawa	351.4
Meneka	221.5		
Gao (Gewgo)	233.9	*Kel Geres*	
		Tessawa	525.0

Thus the annual precipitation in Tuareg country ranges from 11.4 mm in the north to more than 500 mm in the extreme south. In the territories of the Southern Tuareg there is a fixed rainy season in summer, and although the annual precipitation may vary from one year to another there will always be enough rain for the regeneration of perennial plants and the sprouting of annual herbs and grasses. The territories of *Iwllemmeden* and *Kel Geres* largely consist of savannahs where trees and grasses grow over extensive plains. Compared with this we have entirely different conditions in the north, where the territories of the *Kel Ahaggar* and the *Kel Ajjer* are situated on the extreme frontiers of two different rainfall belts, namely that of the Sudan where rain falls in summer, and that of the Mediterranean with a wet season in winter. Therefore there is no special wet season for the whole country of the Northern Tuareg, the most northern parts of which have maximum rain late in autumn or in early spring, while the southernmost regions have summer rain like the Sudan. Rain from the north may however occasionally penetrate as far into the Sahara as the northern outskirts of Ayr, where during my journey from Ahaggar to Ayr in April 1955, I found pastures of annual plants due to winter rain. As far as Ahaggar is concerned rain has, over an extensive period of years, fallen most abundantly late in summer. But what is characteristic of this region as well as of the territory of the *Kel Ajjer* is the fact that rain does not fall every year. In Ahaggar, including the northern massifs of Immidir (Mouydir) and Ahnet, four years out of ten are almost completely dry (Dubief 1947, p. 7-23), and in the flat plains outside the mountains many years may pass between two rainfalls on one and the same spot. These plains have little or no vegetation of perennial plants and are known to the Tuareg as *ténéré* or *tanezrufi*. In or round the mountain massifs there is always a better possibility of rain, and when rain falls in Ahaggar late in summer it is normally accompanied by violent thunder-storms and is very heavy. This in conjunction with the morphology of the mountains makes a perennial vegetation possible.

137

137

7:Nicolaisen E-5 (1951-1962) 1963 MS25 Tuareg MS25

132 When rain is falling in Ahaggar water immediately flows down the rocky mountain slopes into the sandy river valleys, which may become flooded shortly after rain has started. Indeed, the flood will often rise so suddenly and violently that camels and other animals grazing in the valleys are caught by the strong foaming stream of water. Even humans have been killed by the sudden rise of a flood, but most people will not camp in the river bed itself late in summer when heavy rainfalls are expected to occur. A river valley will generally not be flooded for more than one or two days, but it may, after extremely heavy rain, contain water for a week or even longer. This was the case in the summer of 1953 when the valley of Abalessa in Ahaggar turned into an immense river more than a hundred metres
137 wide. Owing to such heavy rainfalls it is possible for perennial plants with a well developed root-system to survive near the river valleys even in dry years. Outside the river valleys there is very little vegetation of perennial plants in Ahaggar. The bulk of the country has no permanent vegetation, and permanent plants are always more abundant along the broad river valleys of the lower country than along the narrow valleys higher up in the mountains.

Pastures of annual plants may spring up almost anywhere in the desert – even in the otherwise barren countries of *ténéré* and *tanezrufi*, where they then constitute valuable fodder for the camels of passing caravans. Rainfall in Ahaggar is most common in the highest parts of the country, where, on the other hand, little perennial vegetation is found. In periods of drought this region is so to speak nothing but rocks and boulders, while after rain in summer it becomes covered with a green curtain of annual plants. South of Ahaggar important perennial vegetation is not found until we arrive at the outskirts of the Adrar and Ayr Mountains, where it is extremely rich compared with Ahaggar. Indeed in Southern Ayr trees and bushes may form dense forests in the valleys outside of which there is also some perennial vegetation. The Ayr Mountains belong to a special zone of vegetation termed *sahel* by French geographers (cf. Capot-Rey 1953a, p. 26 ff.). From an economic point of view the main [132] characteristic of this zone, which includes Ayr and Adrar, is that it has a fixed wet season and consequently pastures of annual plants spring up every year over large areas. South of Ayr and Adrar the zone of *sahel* gradually changes into the Sudanese savannah.

137 Tuareg country thus falls into three distinct zones of vegetation with rather different conditions
311 for stock-breeding:—
233 1) *True Desert* comprising the territories of *Kel Ahaggar* and *Kel Ajjer*. Rainfall is irregular, and pastures of annual plants do not spring up every year. The main livestock are goats, while sheep are bred only to a very limited extent, and the nomads have no cattle.

2) *Sahel* comprising Adrar and Ayr and part of the plains situated between these two mountain massifs. This zone has some of the characteristics of the true desert, but it has a fixed wet season in summer and consequently pastures of annual plants develop every year. Goats are very important and so are sheep; most nomads keep a few cows (zebus).

3) *Savannah* covering mainly the territories of *Kel Geres*, *Iwllemmeden*, and *Kel Tademaket*. Perennial plants grow over extensive plains, and there is a regular spring of annual vegetation. The main kinds of livestock are cows and sheep. In the savannah Tuareg nomads frequently have horses as riding animals, whereas in the two former zones horses are normally bred only by sedentary people. – Camels and donkeys are bred by all Tuareg.

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The climatic and botanical differences between Ayr and Ahaggar can be seen directly from Tuareg division of the year into four seasons each having a duration of about three months. Ayr has a summer season and a winter season between which there are two seasons termed *akasa* (sometimes also called *él*, or *éṛafit*) and *ṛarat*. These two words as seasonal terms indicate that rain and annual vegetation in Ayr are recurrent events. For the word *akasa* literally means "green annual plants" while the word *ṛarat* refers to "dry annual plants". The season *ṛarat*, most of which is extremely dry, is followed by the winter season *tigrest* where rain does not fall, though the northern outskirts of Ayr sometimes have a little rain at this season. The transitional period between winter and summer known as *tabsit* is not considered a main season, but it is frequently mentioned by the Tuareg because certain perennial plants germinate at that time of the year. The summer season *éwilen* is extremely hot and rainless. It is the season of defoliation for acacias and various other perennial plants which change their leaves – generally in the way that they do not loose all leaves at one and the same time. Therefore, even in summer most acacias have some green leaves, though in certain places where rain has not fallen abundantly acacias may loose all their leaves in summer. In certain unfavourable regions outside of the Ayr Massif, acacias may even be without green leaves for a few years, but such trees become verdant again with heavy rainfalls. Scattered barren acacias are found mainly to the north of the Massif. The Tuareg say that acacias can survive an extremely long period of drought during which they are entirely dry. But they normally become green again when rainfalls start. The beginning of the rains is known to the Ayr Tuareg as *t'ézewek*.

In Ahaggar the Tuareg reckon with a summer season named *éwilen* and a winter season called *tagrest*. These two seasons are separated by the autumn known as *amewan* and the spring termed *tafsit*. The Ahaggar Tuareg know the words *akasa* and *ṛarat*, but do not employ them for seasonal terms because rain and annual pasture do not recur annually in their country. The summer season *éwilen* is extremely hot, but it is not the proper season of defoliation for acacias, which under favourable conditions are green in summer and defoliate in winter. The autumn *amewan* which follows upon the summer is characterized by less hot temperatures and gradually changes into *tagrest* (winter) when frost is extremely common during night, and snow falls in the mountains. This cold winter season is followed by the spring *tafsit* when many perennial plants germinate.

As will be seen from this description of the year in Ayr and Ahaggar these two countries differ much in regard to climate and plant development. Within each of the two areas there are climatical and botanical zones which are very different.

The Ahaggar Mountains, according to Maire, fall into three distinct zones of vegetation:— 1) *A Tropical Zone* up to 1700–1800 metres above sea level. 2) *A Lower Mediterranean Zone* between 1800 and 2300–2400 metres above sea level. 3) An *Upper Mediterranean Zone* from about 2400 metres up to 2918 metres which is the extreme altitude of Ahaggar (cf. Maire 1933 & 1940; Lhote 1955, p. 41 f.). This division of the Ahaggar Mountains into zones of vegetation by a learned botanist seems to correspond largely with the division of the mountains into three distinct zones by the Tuareg. These three Tuareg zones and their characteristic perennial plants are the following:—

1) *Abada*, the lower parts of Ahaggar where perennial plants are abundant along the broad river valleys. Trees are very important the main species being various acacias (*abser*, *Acacia Raddiana* &

[text continues on p. 31]

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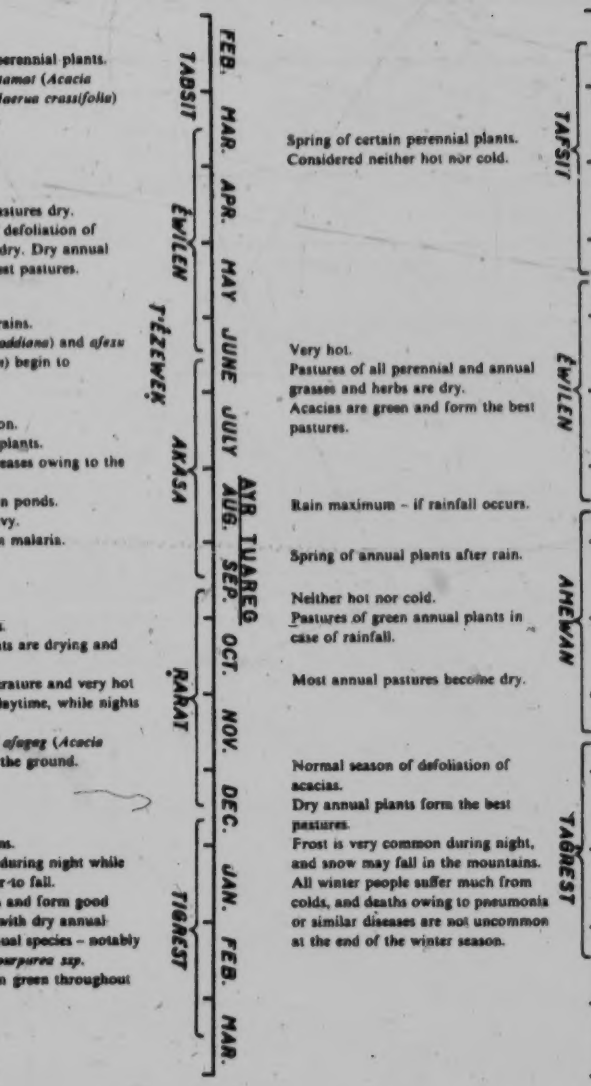

Spring of certain perennial plants. The fruit-pods of *tamat* (*Acacia flava*) and *agar* (*Maerua crassifolia*) fall to the ground.

Very hot. Most pastures dry. Normal season of defoliation of acacias. Wells go dry. Dry annual plants form the best pastures.

Beginning of the rains. *Afagag* (*Acacia Raddiana*) and *afezu* (*Panicum turgidum*) begin to germinate.

Proper rainy season. Spring of annual plants. Temperature decreases owing to the rains. Water abundant in ponds. Dew (*rabo*) is heavy. People suffer from malaria.

Rainfall decreases. Most annual plants are drying and ponds go dry. Increase of temperature and very hot winds (*agzir*) in daytime, while nights are cool. The fruit-pods of *afagag* (*Acacia Raddiana*) fall to the ground.

Cool season begins. Frost may occur during night while snow is said never to fall. Acacias are green and form good pasture together with dry annual plants. A few annual species – notably *alwat* (*Schoenia purpurea ssp. Schimperi*) remain green throughout winter.

Spring of certain perennial plants. Considered neither hot nor cold.

Very hot. Pastures of all perennial and annual grasses and herbs are dry. Acacias are green and form the best pastures.

Rain maximum – if rainfall occurs.

Spring of annual plants after rain.

Neither hot nor cold. Pastures of green annual plants in case of rainfall.

Most annual pastures become dry.

Normal season of defoliation of acacias. Dry annual plants form the best pastures. Frost is very common during night, and snow may fall in the mountains. All winter people suffer much from colds, and deaths owing to pneumonia or similar diseases are not uncommon at the end of the winter season.

Fig. 14. Division of the year into seasons among the Tuareg of Ayr and Ahaggar. Climatic and botanical characteristics are indicated. The *akasa* season is also known to the Ayr Tuareg as *ti* and *tyafi*.

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tamat, Acacia seyal) and tamarisks (*tabarekkat, Tamarix aphylla & azawa, Tamarix gallica* and related species). Other important perennial species are the grasses *afezu* (*Panicum turgidum*) and *tullult* (*Aristida pungens*) the latter grass being found especially around the northern massifs of Anhet and Téfedest, and in Tasilé-n-Ajjer.

2) *Tarayin*, the middle mountain zone which has the following characteristics:— Acacias are lacking or are very rare and badly developed. The big tamarisk (*tabarekkat*) is lacking while the smaller species (*azawa, T. gallica*) is common in certain valleys. Two trees are found which do not grow in the lower zone, namely *tahunek* (*Rhus oxyacantha*) and *alew* (*Olea Lapperrini*). The *tullult* grass (*Aristida pungens*) is missing and the *afezu* grass (*Panicum turgidum*) is scarce.

3) *Atakor*, the highest part of Ahaggar with the following characteristics:— There are no trees with the exception of *alew* (*Olea Lapperrini*), and there are on the whole very few perennial species while annual species are abundant in case of rainfall.

It should be noted that only the important characteristics of the three Tuareg zones are here mentioned, and I add that a few perennial plants are found within all three zones. Thus the perennial species *aramas* (*Atriplex Halimus*) occurs along the valleys in all three zones, but it is of very low stature high up in the mountains, while it forms very high and bush-like tufts in the lower parts of the country.

In Ayr there is also a change of vegetation according to altitude but a general description of this is rather complicated. The lower parts of the Ayr Massif as well as the southern plains are dominated by acacias (*afagag, Acacia Raddiana & tamat, A. flava*) like the lower parts of Ahaggar, and the *afezu* grass (*Panicum turgidum*) is very common almost everywhere throughout the country, while the *tullult* grass is found only in sandy regions at the eastern slopes of the Massif. Species of tamarisks are extremely rare, and this is true of certain other species which are common in Ahaggar. The trees *tahunek* (*Rhus oxyacantha*) and *alew* (*Olea Laperrini*) grow only in isolated mountainous parts of Ayr. The extensive plains west of the Ayr Massif around Ingal are dominated by acacias and the *afezu* grass, but these perennial plants become less and less common towards the north, so that the regions around I-n-abanjerit have very little persistent vegetation but a rich vegetation of annual plants. For further information on the botany of Ayr I refer to the study of Miré & Gillet who describe all known species and indicate their division into particular vegetational zones (Miré & Gillet 1956). I conclude this outline of Tuareg botany with the statement that Ahaggar and Ayr have many important species in common. But there are northern species which do not thrive in Ayr while some southern species are unknown in Ahaggar, e.g., the dum palm *tagayt* (*Hyphaena thebaica*) which plays a great role with the Ayr Tuareg.

Climatically as well as botanically the Ahaggar Mountains are situated on the frontier of two distinct zones, namely the Mediterranean and the Tropical zones, while Ayr is predominantly tropical. This seems true also zoologically, as the Ayr fauna contains a great many species of birds and mammals characteristic of tropical Africa. The bird life of Ayr seems very akin to that of the Sudanese savannah, and, for instance, guinea fowl is extremely common even in valleys of the northern-most parts of the Massif. As example of tropical mammal life in Ayr we may here mention that the wart-hog lives in Central Ayr, and that oryx antelope and giraffe are found in the plains immediately south and west of the Massif. I do not wish here to compare in detail the natural history of Ayr and Ahaggar, but

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Fig. 17. A slave-boy takes kids out of the stone-enclosure (*aǧror*) to let them suck. Ahaggar, the *Aṭuh-en-tehlé* tribe.

*233 yielding decreases after mating. It is said that some goats yield milk in the whole period of gestation, while others have no milk whatever during most of that period.

The advantage of free mating is further reduced because goats, if mated too often, become emaciated, and for the northern breed their coat of long hair, so important to craft (cf. p. 263 ff.), will not develop fully. Added to this, kids born in the hot summer season will often be of inferior quality, as they suffer from heat and the lack of fresh annual plants during their period of growth. Again, the mother animals may yield so little milk in summer that it is not even sufficient for the nourishment of their kids.

The free mating of goats is not generally desirable, and therefore most Tuareg practise a system of regulation which varies with the qualities of pastures. If reproduction of the flock is badly needed it may happen that all goats are mated twice a year, but it is considered an ideal in good years to divide the animals into two parts which bring forth kids and yield milk at different seasons.

*233 In Ayr when the flock is divided into two parts to bring forth kids and yield milk at different seasons,
132 one part brings forth kids during the season of *akasa* when the pastures of annual plants are very
[137] rich, the other at the end of the winter season during the period known as *tabsit* at which time certain other plants germinate, and fruit-pods of the *afagag* acacia (*Acacia Raddiana*), which are extremely good for fodder, fall to the ground. If kids are wanted for a flock during the season of *akasa*, which is the best season for the birth of kids, the goats are mated in winter. When all the she-goats have been covered, the penis of the he-goat is bound around the foreskin by means of a cord – a method which is known to the Ayr Tuareg as *ɛḫḫən*, to the Northern Tuareg as *ṣṛun* (cf. Fig. 25). If kids are wanted for a flock in spring at the season of *tabsit*, mating stops with the binding of he-goats at the

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end of the *akasa* season. In other words:— When the inhabitants of a camp have their collectively guarded goats divided into two parts, one of these brings forth kids at the time when the other is mated. 233* 132

This method of mating-regulation is that ideally used by prosperous goat-breeders both in Ayr and among the Northern Tuareg. If in the north a flock is divided into two parts the kids are born in autumn (*amewan*), and in spring (*tafsit*) the former season being the better. Kids brought forth between these two seasons are known as *amezakar*. But as climatic conditions and consequently also the quality of pastures change from one year to another in the true desert country, the mating-system of division into halves cannot always be practised in Ahaggar and in Tasilé-n-Ajjer. In severe periods of drought goats may be too meagre for mating for a whole year or even longer, during which time the he-goats will have their penis bound. Thus during the dry year 1954/55 no goats were mated in Ahaggar. – It should be noted that the best season for the birth of kids is the late summer or the autumn (*akasa*, *amewan*) when the tender annual plants spring up. Kids borne at this season will be fully grown for mating after one year so that they bring forth kids at the season of spring (*tafsit*, or *tehsit*), while kids born in spring will be mated after a year to bring forth kids late in summer or in autumn (*akasa*, or *amewan*).

Milking takes place twice daily – early in the morning before the flock leaves for grazing, and late in the evening one or two hours after the return of the animals to the camp. Milking is done by women, or occasionally by male slaves. The individual animals to be milked are frequently called by their names and a special sucking sound is made to calm the animals, which are milked differently in Ayr and Ahaggar. In Ahaggar the milk-maid holds the wooden milk-bowl (*akus*; Fig. 21b) in her left hand, presses the left hind leg of the goat firmly under the upper part of her right arm, while she milks with her right hand (Fig. 23–24). In Ayr milking of goats is frequently performed in a standing position the milk-maid then holding the milk-bowl (*takabart*; Fig. 37) in her left hand, keeping the left hind leg of the animal firmly between her knees, and milking with her right hand. If the milk-maid milks 234 462 192 184 415

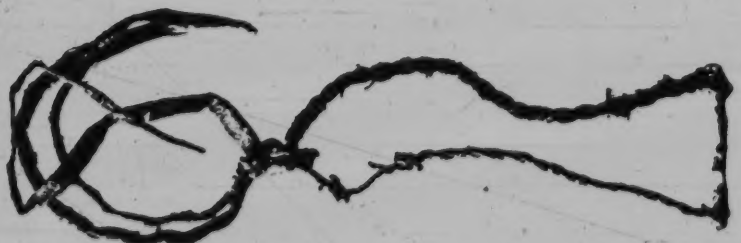

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Fig. 18. The little stick (*akasa*, *assaḍus*) used by the Northern Tuareg to prevent half-grown kids from sucking. Ahaggar, the *Ajjak-en-tekki* tribe. Dimension: the stick 0.056 m; the cords 0.330–0.380 m. (N.M. G. 5825).

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to be considered rich in goats (and sheep) should own about 300 animals. They also say that in the past the Tuareg of their group owned more goats (and sheep) than nowadays. A household at that time might even possess up to a thousand animals, but it would not have many camels and very few zebus, or none. In Southern Ayr, according to the Tuareg, there has been no severe period of drought within the memory of man, and goat-breeding is consequently a much more stable industry than in the desert proper.

SHEEP

Sheep are very important domestic animals to most North African pastoralists. In the Atlas and on the outskirts of the Northern Sahara sheep belong to various woolly breeds. Woolly sheep are also known in isolated parts of the Western Sudan around Mucina south-west of Timbuktu (Doutressoulle 1947, p. 191 ff.). I have myself seen many woolly sheep along the Niger between Niamey and Ayoru – among the Zerma-Sonray and other semi-sedentary peoples – but I have not seen them in the camps of pastoral Tuareg and *Bella*. These sheep belong to the so-called "Goundoum" breed (Zerma) and according to Doutressoulle they constitute a degenerate type of the Mucina breed (cf. Doutressoulle 1947, p. 195). It is recorded by Aymard that there are some woolly sheep among the south-western Tuareg (Aymard 1911, p. 118). However, Tuareg sheep in all other groups belong exclusively to the hairy breed which is known as *Ovis longipes*.

It is admitted by zoologists that *Ovis longipes* characterized by a short cover of hair, high stature, and a long thin tail, is the oldest known type of domesticated sheep (cf. Adametz 1920, p. 59 ff.; Antonius 1922, p. 213 ff.; Hilzheimer 1936, p. 199; Doutressoulle 1947, p. 196). In North-western Africa this hairy sheep falls into two types:— (1) The rams have large circular or snailshell-formed horns. This is the breed known to all Northern Tuareg, the Ayr Tuareg, and the *Kel Geres*, and apparently also to other Southern Tuareg. (2) The rams have very long horns of corkscrew form which protrude horizontally. This type is found among some Southern Tuareg, and it is occasionally seen in Tuareg camps immediately south of the Ayr Massif. The Ayr Tuareg say that this breed is typical of the Fulani, and this is in agreement with Doutressoulle's statement (Doutressoulle 1947, p. 200). This latter type of *Ovis longipes* sheep is also known among Nilotic peoples of the Anglo-Egyptian Sudan, and it seems to have been known in Ancient Egypt. It is perhaps the oldest type of *Ovis longipes* sheep (cf. Adametz 1920, p. 59 ff.).

In Ahaggar and Tasilé-n-Ajjer sheep are of relatively little importance to pastoral Tuareg. I believe that very few Tuareg of these regions have more than one sheep to ten goats. The reason for this lies in climatic conditions, for effective sheep-breeding is not possible where pastures do not regenerate regularly, as sheep cannot feed properly on the thorny acacias as can goats. Conditions of sheep-breeding are much more favourable in Ayr than in the north, and certain pastoral Tuareg of Southern Ayr have more sheep than goats, though sheep in Ayr suffer from lack of fodder in the dry hot season when they are extremely thin and meagre. With good grazing sheep yield more milk than goats, but otherwise goats are better milch animals. The meat of sheep is considered superior to goat meat, and

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the caravan and feed the animals with annual grasses, and a camel-rider, when he meets plants considered excellent for fodder, will stop for a while to let his riding camel eat them.

Saliferous plants are highly important to all types of livestock, and camels and sheep in particular need much salt nourishment. In Ahaggar there are certain plants of this kind almost everywhere, and the following species serve as fodder:— *aramas* (*Atriplex Halimus*), *issin* (*Salsola foetida*), *tabarekkat* (*Tamarix aphylla*), and *azawa* (*Tamarix gallica* and related species). *Aramas* in particular is very important. It is found almost everywhere within the Ahaggar Massif and at all altitudes. Benhazera states that *aramas* forms the most important fodder plant of Ahaggar (Benhazera 1908, p. 65), but this is not quite correct. It is most important because of its salt content as domestic animals do not thrive without salt, but the saliferous plants mentioned are very little nourishing for most domestic animals, and if the animals constantly eat such plants they become very thin. The most nourishing fodder plants of Ahaggar are tender annual species which spring up after abundant rainfalls. These plants are collectively known to the Ahaggar Tuareg as *akasa*; they comprise many different species and those considered most excellent for fodder are: *tageruft* (*Tribulus terrester*), *adreylal* (*Astragalus* sp.), *tayuast* (*Echium humile*), *azren* (*Monsonia heliotropioides* & *M. nivea*), *tamaghé* (*Moricandia arvensis*), and *tanesmimt* (*Rumex vesicarius* & *R. roseus*). To these annual fodder plants can be added another important annual species, namely *ahut* (*Schouwia purpurea* ssp. *Schimperi*) which grows in the lower parts of Northern Tuareg countries. It is apparently not so common and important to the Northern Tuareg who live in and around the mountainous massifs, though it is a common and very valuable fodder for domestic animals of the Ahaggar Tuareg who live towards the south in the plains of Tamesna. It is one of the best fodder plants for camels and is also fairly good for sheep, while less valuable for other types of livestock. Annual plants may germinate over a large part of the year in Ahaggar, but as rainfall is most common late in summer (June, July, August) the best annual pasture will spring up at this period, and under very favourable conditions the plants may keep fresh and green for up to four months. When annual plants wither they are known to the Ahaggar Tuareg as *farat* (*farat n akasa*). Such dry annual plants have lost much of their fodder value, but they are important for fodder even at this stage. The perennial species which are most important for fodder have their optimal value at particular stages of their development at particular seasons. Important are the perennial grasses known to the Tuareg as *tulluli* (*Aristida pungens*) and *afezu* (*Panicum turgidum*). The *tulluli* grass is extremely common in the Northern Sahara, and it forms perhaps the basic fodder plant among the Tuareg of Tusilé-n-Ajjer. It is also common in Ahnet and in the other mountain massifs surrounding Ahaggar to the north, but it is not found in the mountain massif proper of Ahaggar where most Tuareg live. The grass grows at Abalessa where cattle, goats, and sheep of the sedentary farmers feed upon it. The *tulluli* grass is valuable when green in winter, and hay of this grass is used for camel fodder on caravan expeditions to Tidikelt. The Tuareg cut it with a sickle and take it with them on the journey to the northern oases, because there is normally little vegetation on the road and no pasture around the oases where the Tuareg remain to trade for several days. The *afezu* grass is extremely common in the lower parts of Ahaggar and is found in practically all river valleys. It is valuable for fodder when green after rain, but it is of little value when withered. There are other perennial herbs and grasses which are eaten by domestic animals, but herbs and grasses are

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Each of the three vegetational zones of Ahaggar has its advantages and disadvantages. If we consider a good year when rain has fallen abundantly with a resultant regeneration of all fodder plants, the *Atakor* zone has very excellent pasture. For the plains and the stony mountain slopes are then entirely covered with annual plants which by the Tuareg are considered the very best fodder. The Tuareg also claim that the upper mountain zone is preferable because of its cooler climate, which has a beneficial influence on the lactation of domestic animals. The disadvantage of the *Atakor* zone is the lack of acacias to which can be added the scarcity of fuel. The *Tarayin* zone possess characteristics of the *Atakor* zone and of the *Abada* zone. The *Abada* country is botanically very different from *Atakor*. It has annual pastures of great value when abundant rainfall has been experimented and it also has valuable pastures of perennial plants. With heavy rain the *Abada* country is excellent for stock-breeding, and fuel can be found everywhere. But the Abuda country is hotter than are the zones of *Tarayin* and *Atakor*.

If rain falls abundantly all over Ahaggar there is good pasture in all three zones. But rainfall is more frequent and heavier at high altitudes than in the *Abada* zone, so that *Atakor* normally has by far the best pasture of annual plants which spring up late in summer or in autumn. The *Abada* zone on the other hand has the very best pasture of perennial plants, notably acacias that grow around the lower parts of the valleys which are always flooded when it rains in the high mountains.

The fluctuations of plant development determine the nomadic migrations of the Ahaggar Tuareg. A few tribes have their normal grazing grounds in *Atakor* (e.g., the *Dag Rali* and the *Kel Tazulet*). They camp in this zone at most seasons to let their goats and sheep feed on fresh and dry annual pasture. In dry years and during the hot summer season they may move to the *Tarayin* zone where there are perennial fodder plants, but they rarely camp in the *Abada* country. Many tribes have their normal grazing grounds in the *Abada* zone (e.g., the *Aguh-en-tehlé*, the *Ayt Lowayen*, the *Iheyawen Huda*, and the *Kel Rela*), but move to the *Atakor* when annual pasture is good in this region. They live in *Atakor* with tents and flocks when annual plants are green, while the rest of the year they camp in the *Abada* country to let their animals feed on acacias and other perennial species. Finally there are two tribes (*Tégehé-n-Efis* and *Iklan-en-tawsit*), the members of which camp in the *Abada* country all the year round even when rich annual pasture is found in *Atakor*. However, members of these tribes may send their camel herds to the *Atakor* zone, accompanied by herdsmen, while tents and flocks remain in the lower country.

With the exception of a few noble households which keep up their old tradition to subsist largely on camel's milk, the Ahaggar Tuareg do not keep their she-camels in Ahaggar unless there are excellent pastures of annual plants in this area. They take their camels to pastures far away from Ahaggar, notably to the Tamesna region where they have their animals guarded by herdsmen who are frequently slaves. In very dry years there are very few camels in Ahaggar – just the animals needed for riding and transportation. It is in fact very easy to take camels to distant pastures, and it is most necessary to give these animals the utmost care as they are most valuable and their breeding is a very slow process (cf. p. 56). Goats do not need such excellent fodder as do camels. They can eat almost everything, but in dry years goats may also suffer severely from lack of suitable fodder. This was the case in the year 1954/55 when I stayed in Ahnet and in Ahaggar. In the small camps of three to four tents each it was

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normal every day to loose one or two goats which died of hunger. The goats were too thin to be mated, and even in winter there was no milk, or so little, that it was all consumed by small children. In spite of these very severe conditions most Ahaggar Tuareg stayed in Ahaggar with their flocks which subsisted on dry perennial plants and annual plants that were two years old. Conditions were extremely bad in the region of Ahnet, and about half of the Ahnet Tuareg left their country to go southwards with their camps and goats, to the regions of Ti-n-zawaten. In severe drought periods some Tuareg may move their camps far outside of Ahaggar, but even then most of them will remain in their native country for extensive goat migrations are difficult and cannot be realized without a loss of the meagre animals. Most Tuareg therefore prefer to remain and to avoid the strenuous journey connected with these migrations. They may loose many animals during a drought, but they know that sooner or later rainfall will occur so that pastures will regenerate quickly to let the animals grow fat to yield milk and to be mated. The increment of goats is extremely quick in comparison with that of camels.

Stock-breeding conditions are on the whole not very favourable in Ahaggar, but pastoral Tuareg of this region have developed an economic system which secures their existence even in very bad years of extreme drought.

In the introductory description of Tuareg environment it was stated that the Ayr Massif and the surrounding plains have far better possibilities of stock-breeding than Northern Tuareg countries. The broad river valleys of Ayr are very rich in persistent plants which also grow on slopes and in depressions outside the valleys, and the spring of annual pastures is an annually recurrent event. One informant told me that there had not been any drought in the Agadez region throughout the many years the French had reigned over Ayr. At an unknown date in the past, it is said, a very severe drought persisted in the country for a period of seven years, and the Tuareg who had many goats and sheep fed these animals on charcoal. Since then rain has fallen every year and though more

Fig. 96. Tuareg feeding his riding camel with boiled tea leaves which are considered excellent fodder for camels. Ahaggar, the *Dag Rali* tribe.

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abundantly in one year than another there has always been rain enough to allow the annual pastures to spring up.

In Ayr there are three species of trees or bushes which remain green all the year round, viz. *ébezgin* (*Salvadora persica*), *tadent* (*Boscia senegalensis*), and *turza* (*Calotropis procera*). They are extremely common, and the two first species play a certain role for fodder during the hot and dry summer season (*éwilen*), but dry annual plants then constitute the best fodder for all domestic animals. The annual plants comprise various species; around Agadez they are mainly grasses, but the small thorny seed-plant *ageruf* (*Tribulus terrester*) is also very important. These tender plants spring up shortly after the rains but they wither even before rainfall stops at the beginning of the *ɣarat* season. The perennial fodder plants are of little value in the hot season. The *afezu* grass (*Panicum turgidum*), which is extremely common everywhere, germinates at the beginning of the rains and is dry and contains little nourishment in summer. Acacias form very important fodder plants for camels and goats, but they are also of little value at this season when they defoliate. The two most important acacias are *afagag* (*absor* in Ahaggar) (*Acacia Raddiana*) and *tamat* (*Acacia flava*). The *afagag* acacia germinates shortly after the first rains (*akasa*) and has its highest fodder value in the season of *ɣarat* when the fruit pods fall to the ground providing excellent fodder for all domestic animals. The *tamat*-acacia starts germinating somewhat later and its fruit pods, which are equally important for fodder, do not fall until the beginning of the season known as *tabsit*, at which period the fruit pods of the *agar* tree (*Maerua crassifolia*) also fall. For southern Ayr it can be said that grazing conditions are tolerably good most of the year. They are extremely good when annual plants are green during the period of *akasa*, and they are bad in summer (*éwilen*) when the lactation of domestic animals is low.

Grazing conditions within the Ayr Massif are much more favourable than in Ahaggar, but one thing is lacking:— There are very few saliferous plants. Thus, for instance, there are very few tamarisks (*temeyut* = *Tamarix aphylla*; *azawa* = *Tamarix gallica*), which are found only within limited areas of the Massif; species of *Salsola* are very rare, and the very important saliferous plant, known to the Northern Tuareg as *aramas* (*Atriplex Halimus*), is not found within the Massif. The Ayr Tuareg therefore have to feed their animals with salty earth which can be dug in certain parts of Ayr, or with Bilma salt, which plays an enormous part for most stock-breeders of Ayr and adjacent regions. The Ayr Tuareg cannot so easily take their flocks and herds to salt pastures as can the Northern Tuareg. But there is south and southwest of the Ayr Massif a narrow belt of salt-containing soil and water. This region is known to the Tuareg as *Azawaɣ* because of its particular reddish soil. With this particular type of soil, well water and pools will contain some salt, as do most plants, and many Tuareg of the Ayr Massif migrate to the *Azawaɣ* country at the end of the rains to allow their animals to benefit from the salt-content of the water and plants there. There is another reason why some Ayr Tuareg, who have their normal grazing areas within the Massif, migrate south and westwards into the plains, namely the appearance in these regions of a small annual plant known as *emchéken* (*Ipomoea verticillata*). The Ayr Tuareg consider it one of the very best fodder plants for camels, goats, and sheep, but claim it to be less valuable for cattle and donkeys. – At the end of the rains the Ayr Tuareg who migrate to the *Azawaɣ* country camp among pastoralists of different and distant regions. At this season most *Kel Geres* Tuareg migrate northwards to camp around Tegidda-n-edrar and Tegidda-n-

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Fig. 98. A slave watering goats by means of the leather bucket called *aga*. Water is drawn from a well and poured out into a hole dug in the clayey ground. The goat standing to the left is sheared – a token of the summer season. Tasilé-n-Ajjer.

*233 [272] [271] conditions, and herdsmen, who live with camelherds far away from camps and wells subsisting on camel's milk, do not consider water necessary. Should domestic animals have eaten salt or salty plants they are very eager for water even in winter. When I lived in Ahaggar with my camels during the winter 1954/55 they had rightly to be watered every ten days, but in regions where they fed mainly on saliferous plants they had to be watered more frequently. However, domestic animals must not be watered too often as this would make them slow and emaciated, and a camel must not be worked too hard the day after it has been watered.

312 [361] Tuareg camps are always found around wells, pools, or other types of water places for which there is a large vocabulary. But the Tuareg never camp too close to water places where there is little pasture, many foreigners and consequently little peace. The distance from camp to water place varies, but is very frequently 1–3 kilometres. During the rainy season (*akasa*) water is very aundant all over Ayr, but outside this period conditions of water supply for human beings and livestock are more favourable in the north than in Ayr, where water most of the year must be drawn from wells. To raise water the Tuareg use a leather bucket known to the Ahaggar Tuareg as *aga* (Fig. 97–98). The water drawn for the animals is poured out into a hole dug in clayey soil, or into a hole covered with a piece of skin or leather known in Ahaggar as *tafarawt*. This skin is nowadays frequently substituted by canvas (cf. Fig. 99). Where water is scarce and must be drawn from narrow wells, as in Ayr during the summer season, the watering of flocks and herds gives rise to frequent quarrels between pastoralists. For though the right to the use of wells is free to all there are many disputes and fights frequently

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Fig. 133. The large water basin (*ilhemi*) from which water is led into the gardens. Ahaggar, Abalessa.

(*teguhamt*, or *tahaft*) from which another canal (*tahaft*, or *teguhamt*) leads water out into the garden, which is always divided into a large number of garden beds (*igemmunen*, sing. *agemmun*) surrounded by low ridges and separated by narrow irrigation canals. The large water basin serves to regulate watering, which outside of the very cold season is done during the night. A flat stone with a hole in its middle and known as *anefif* is placed between the basin and the canal leading water into the garden; water for irrigating the garden flows through this hole when irrigation is needed at night, while the hole is closed by means of a cotton stopper during the day. The basin is thus filled with water during the day and its water runs into the garden at night (cf. Figs. 131–136).

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The irrigation systems described are most important for the cultivation of the winter crops of wheat and barley. The Tuareg word in Ahaggar for wheat is *ered* which is a collective name for several types of wheat known as *elkhamra*, *elmansuri*, *amekkawi*, *rati*, and *menga*. These special names seem to be derived from Arabic (cf. Foucauld 1951–52, III, p. 1058, 1211 & IV, p. 1789; Maire 1933, I, p. 246). According to Maire these types of wheat belong to the species *Triticum aestivum*. I have never myself seen fully-grown wheat in Ahaggar and was thus unable to collect ears for identification by botanists, but seeds brought home from Ahaggar and Tasilé-n-Ajjer have been identified by Dr. Hans Helbaek as belonging to common bread wheat. Barley is known to the Tuareg as *timzin*. Threshed seeds brought home from Ahaggar have been identified by Dr. Helbaek as belonging to the six-rowed type (*Hordeum vulgare*, though some, he thinks are perhaps of the two-rowed type (*H. distichum*). Barley, like wheat, is a winter crop though less common. At Abalessa I was told that two thirds of the seed-crops grown in winter were wheat, while only one third was barley.

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Wheat and barley are grown in the same way. Sowing is done in the autumn (*tober*), and the seeds are put into the garden beds with the fingers. Harvesting takes place in the month of April (*ibri*) and is performed with a sickle (Fig. 143). The growing of wheat and barley is a very strenuous task for irrigation agriculturists. Watering is done for the first time immediately after sowing. When I stayed at Abalessa, in the month of January 1955, the tender plants of wheat and barley were watered two days in succession, and the 10–12 gardens belonging to the same *foggara* were irrigated in succession in this way. At that time of the year the plots are not generally watered at night because of the cold temperatures which may be below zero.

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suitable natural boughs are abundant. There are advantages and disadvantages in mat tents as well as in skin tents. During the very hot season the mat tent is by far the best type of dwelling; it is comparatively high and the mat covering is not heated to any great extent by the sun. During the rainy season the mat tent is less practical than the skin tent. Rain may fall so heavily and abundantly that it penetrates the mat covering, and even if it does not it will be necessary to remove all mats after a heavy shower in order to dry them in the sun. The skin tent is normally erected quicker than the mat tent, it protects efficiently against rain, but is, on the other hand, most unpleasant during the hot season. It does not seem possible to explain the distribution of mat tents and skin tents on purely geographical grounds, but it seems as though the mat tent is used mainly where dum palm leaves for plaiting are available. Where the dum palm disappears, the mat tent tends to disappear also, though mat tents, as we have seen, may be provided with a covering of *ẽwerwer* type (p. 350 f.). Outside of the dum palm area most Tuareg have skin tents for portable dwellings. Within the dum palm area mat tents and skin tents are mixed in certain regions, and it has been seen that certain Tuareg use mat tents during the very hot season before the rains, but adopt skin tents when the rains start. This seem to indicate clearly the advantage and the disadvantage of the two dwelling types. But the advantages of both dwellings can be obtained in another way, namely by placing a sheet of skin over the top of the mat tent in the rainy season. This is actually done by many Tuareg. I was told that the *Kel Faday* Tuareg around Ingal very frequently cover their mat tents with skin during the rainy season, and remove the skin again when the rains are over. It is perhaps this to which Rodd refers in a brief note on Tuareg tents in Ayr (Rodd 1926a, p. 212), and we may be sure that the usage is a very ancient one in these regions, for it is mentioned already by Ibn Batutah in reference to the *Bardamah*, who are stated to be nomads that frequently move their camps (cf. Ibn Batutah IV, p. 437). The custom of covering mat tents with a sheet of skin has also been noted in the case of the *Iwllemmeden* Tuareg by Barth (Barth 1857–58, I, p. 597 f.). It is very possible that it is still more widely known in Southern Tuareg groups, as it allows in an easy way the advantages of both types of dwellings.

B.2. *Skin Tents.*

Skin tents are used by Tuareg in all groups, though there is some doubt as to the use of skin tents among the *Kel Geres*. I have myself previously stated that they have skin tents (Nicolaisen 1959, p. 118), this statement being based on information gathered in Ayr 1955. Lhote also mention that some *Kel Geres* use skin tents, while other pastoralists in this group own mat-covered tents (cf. Lhote 1947a, p. 79, phot. 51 p. 80–81). But when I visited the camp of the *Kel Geres* drum-chief in 1959 he claimed that the *Kel Geres* always live in mat tents. As to the *Kel Ayr*, skin tents are very rare among them. In all other Tuareg groups skin tents play a very important role. They constitute so to speak the only kind of portable dwellings among the Northern Tuareg and the *Kel Adray*, and they form the most common type of tent also in the two groups of *Iwllemmeden* Tuareg. Zeltner says that the dividing line between skin tents and mat tents in Southern Tuareg country follows the Paris Meridian (Zeltner 1914a, p. 364), but this is in fact no true dividing line between these dwelling types, which are sometimes used by the same people at different seasons, and the two tent types are sometimes combined into one, as mat tents may be covered with skin throughout the rainy season.